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EXAMINER

QUAN, ELIZABETH S

ART UNIT	PAPER NUMBER
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1743

DATE MAILED: 06/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/888,591

Applicant(s)

STERZEL ET AL.

Examiner

Elizabeth Quan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-19 is/are rejected.
- 7) ☒ Claim(s) 15 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election of group I, claims 1-10 in the reply filed on 3/17/2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Objections

2. Claim 15 is objected to because of the following informalities: "polytetrafluorethylene" should be "polytetrafluoroethylene". Appropriate correction is required.

3. Claim 18 is objected to because of the following informalities: "gamma-butyrolacton" should probably be "gamma-butyrolactone". Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

5. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Referring to claim 8, it does not make sense that the substrate is laid on a matrix plate with holes with the dispensing taking place into the holes. There is either a missing process step wherein the substrate is laid on a matrix plate and flipped over for dispensing or the claim actually means that the matrix plate is laid on the sheet-like substrate instead. Amendments to correct the claim according to the latter possibilities may be considered new matter, as they are

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not supported by the specification. For examination purposes, the claim has been interpreted as the matrix plate is laid on the sheet-like substrate. Note that the matrix plate being laid on the sheet-like substrate, which means the matrix plate is placed on top of the sheet-like substrate, does not have the same meaning as the sheet-like substrate being laid on the matrix plate, which means the sheet-like substrate is placed on top of the matrix plate.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 2, 5-14, 16 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 5,985,356 to Schultz.

Schultz discloses a method for the preparation and use of a substrate with an array of diverse materials in predefined regions (ABSTRACT; COL. 3, lines 12-21; COL. 11, lines 42-44). Essentially, any conceivable substrate can be employed (COL. 11, lines 44 and 45). The substrate can be organic, inorganic, biological, non-biological, or a combination of any of these, in the form of a sheets, particles, strands, precipitates, gels, tubing, spheres, containers, capillaries, pads, slices, films, plates, slides, etc. (COL. 11, lines 44-49). The substrate and its surface preferably form a rigid support on which to carry out the reactions (col. 11, lines 55-57). With the disclosure of reactions being carried out **on** and not into the rigid support, one would expect that the reaction would not penetrate into the substrate. Furthermore, the disclosure of the

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desire to prevent contamination between reaction regions further implies that the substrate is non-penetrating (col. 13, lines 24-42). The substrate may be any of a wide variety of materials including polymers, plastics, pyrex, quartz, resins, silicon, silica or silica-based materials, carbon, metals, inorganic glasses, inorganic crystals, membranes, etc. (col. 11, lines 57-61). Some of these materials, including metals, support a non-penetrating substrate (col. 11, lines 57-61). Surfaces on the solid substrate can be composed of the same materials as the substrate or they can be different, i.e. the substrates can be coated with a different material (col. 11, lines 63-66). The substrate surface can contain thereon an adsorbent (for example, cellulose) to which the components of interest are delivered (col. 11, line 66-col. 12, line 1). Schultz et al. disclose that the most appropriate substrate and substrate-surface materials will depend on the class of materials to be synthesized and the selection in any given case will be readily apparent to those of skill in the art (col. 12, lines 1-5). The substrate may be divided into individually defined positions spatially delimited from one another by distance, dimples, wells, raised regions, etched trenches, etc. to prevent reactant components in the individual reaction regions from moving or diffusing into other reaction regions (COL. 5, lines 54-64; COL. 10, lines 7-23; COL. 11, lines 53-55; COL. 13, lines 24-42). The dimples may be considered pores in the substrate since <http://m-w.com> defines a pore as **1:** a minute opening especially in an animal or plant; *especially* : one by which matter passes through a membrane

2: a small interstice (as in soil) admitting absorption or passage of liquid. These dimples will preferably have a depth of less than 100 microns and more preferably less than 25 microns below the upper surface of the substrate, such that the dispensed material absorb or penetrate at a maximum of 100 microns (col. 13, lines 43-52).

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Various dispensers may deliver suspensions of powders of the elements of the periodic table (COL. 4, lines 12-17; COL. 10, lines 37-67; COL. 11, lines 1-24; COL. 15, line 7-COL. 18, line 19; COL. 20, line 18-COL. 26, line 51). For example, an RF magnetron sputter gun may deliver copper oxide, calcium oxide, and lead oxide, and an ink-jet printer may deliver styrene, acrylonitrile, and benzoyl peroxide in toluene solutions (COL. 31, line 39-COL. 33, line 51). Other dispensers include micropipettes, electrophoretic pumps, sputtering systems, sprayers, lasers, beams, etc. (COL. 4, lines 15-17; COL. 16, lines 37-59). A frame of reference common to the delivery instrument and substrate provides for consistent deposition of droplets at precisely defined regions by the dispenser (COL. 22, line 13-COL. 24, line 52). Additionally, masks or other physical means may be employed for dispensing drops onto the same point of the substrate (FIGS. 2 and 3; COL. 11, lines 9-34; COL. 18, line 20-COL. 20, line 12). The mask has holes that align with defined positions on the substrate to accurately dispense droplets in a certain position (FIGS. 2 and 3; COL. 17, line 59-COL. 20, line 17). Each of the holes has a steep incline of 90 degrees (fig. 8). The mask can be made of any suitable material, including polymers, silicon metals, inorganic glasses, etc. (COL. 18, lines 25-27). The reactant components at least partially dry on the substrate prior to the removal of the mask in preparation for screening since the substrate may be exposed to ambient air or other gases or heated during or after dispensation and the flow rate of the dispenser may be adjusted such that droplets dry immediately upon contact with the substrate surface (COL. 25, line 12-COL. 26, line 27; COL. 32, line 9-61; COL. 35, line 64-COL. 36, line 56; CLAIMS 1 and 14-16). Note: Applicant's specification on page 4, lines 30-32 require only partial drying. The control of droplet size may be accomplished by various techniques (COL. 24, lines 36 and 37). In one example, 5

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microliters of a reactant is added to the substrate (COL. 33, lines 40-45). Tables III-VI show reactants delivered to the substrate in amounts from 1 to 1000 microliters (COLS. 33-38). The substrate is arranged horizontally, and the dispensing device vertically charges the substrate, such that the dispensing direction is in a plane perpendicular to the substrate (COL. 11, lines 32-34; COL. 22, lines 49-51; COL. 23, lines 18-20 and 60-67; COL. 24, lines 1-23). The products present at individually defined positions of the substrate are analyzed for a desired property using physical and/or chemical methods (COL. 26, line 52-COL. 31, line 38).

In one embodiment, a first component of a first material is delivered to a first region on the substrate, and a first component of a second material is delivered to a second region on the same substrate (COL. 3, lines 35-38). Subsequently, a second component of the first material is delivered to the first region on the substrate, and a second component of the second material is delivered to the second region on the substrate (COL. 3, lines 39-42). The process is optionally repeated with additional components to form a vast array of components at predefined, known locations on the substrate (COL. 3, lines 42-44). The components are simultaneously reacted to form at least two materials (COL. 3, lines 45 and 46). The components can be sequentially or simultaneously delivered to predefined regions on the substrate in any stoichiometry, including a gradient of stoichiometries, using any of a number of different delivery techniques (COL. 3, lines 46-50).

In another embodiment, at least two different arrays of materials are formed by delivering substantially the same reaction components at substantially identical concentrations to reaction regions on both first and second substrates and, subsequently, subjecting the components on the first substrate to a first set of reaction conditions and the components on the second substrate to a

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second set of reaction conditions (COL. 3, lines 51-58). The effects of various reaction parameters can be studied on many materials simultaneously and optimized (COL. 3, lines 58-61). Reaction parameters include reactant amounts, reactant solvents, reaction temperatures, reaction times, pressures and atmospheres in which reactions are conducted, quenching rates of reactions, order in which reactants are deposited, etc. (COL. 3, lines 61-67).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,985,356 to Schultz in view of U.S. Patent No. 5,985,214 to Stylli et al. or U.S. Patent No. 5,226,462 to Carl.

Schultz does not explicitly disclose that dispensing is carried out by displacing movable plungers in the dispensing device. It is well known to use dispensing devices with plungers, as demonstrated by Stylli et al. that disclose nanoliter dispensers may be operated by a piston driven by a motor or gas bottle (COL. 16, lines 11-28; COL. 60, lines 43-48) and Carl that disclose a dispenser in which dispensing is carried out by pistons and cylinders in the dispenser for producing accurate, precise, and adjustable amounts of liquid. Therefore, it would have been obvious to one having ordinary skill in the art to carry out the process of Schultz with a dispensing device operated by a piston driven by a motor or gas bottle for producing nanoliter droplets as taught by Stylli et al. or dispenser in which dispensing is carried out by pistons and cylinders in the dispenser for producing accurate, precise, and adjustable amounts of liquid as taught by Carl.

13. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,985,356 to Schultz in view of U.S. Patent No. 5,985,214 to Stylli et al. or U.S. Patent No. 6,508,984 to Turner et al.

Schultz does not explicitly disclose that the dispensable material components are dispensed and mixed on an auxiliary substrate prior to being taken up by a dispensing device and dispensed onto the substrate. Stylli et al. disclose generating daughter plates from master plates

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of stock solutions using a dispensing device (FIGS. 9A, 12A, and 12B; COL. 4, lines 8-11; COL. 5, lines 4-8; COL. 12, lines 5-31 and 62-67; COL. 13, lines 1-5; COL. 16, lines 4-8; COL. 31, lines 57-61; COL. 50, line 54-COL. 51, line 8). The daughter plate may contain dilutions of the stock solutions (FIGS. 9A, 12A, and 12B; COL. 4, lines 8-11; COL. 5, lines 4-8; COL. 12, lines 5-31 and 62-67; COL. 13, lines 1-5; COL. 16, lines 4-8; COL. 31, lines 57-61; COL. 50, line 54-COL. 51, line 8). The contents of the daughter plate may be transferred to a sample plate (FIGS. 9A, 12A, and 12B; COL. 4, lines 8-11; COL. 5, lines 4-8; COL. 12, lines 5-31 and 62-67; COL. 13, lines 1-5; COL. 16, lines 4-8; COL. 31, lines 57-61; COL. 50, line 54-COL. 51, line 8). Turner et al. disclose daughter ligand libraries generated from a parent ligand library and metal precursors are added to daughter ligand libraries to generate daughter catalyst libraries in which product libraries may be generated (COL. 14, line 31-COL. 16, line 38). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Schultz to mix the reactants on an auxiliary substrate prior to be taken up by a dispensing device and dispensed onto the substrate as in Stylli et al. or Turner et al. for high-throughput processing and screening of chemical libraries.

14. Claims 12-14, 17 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,985,356 to Schultz.

The instant specification discloses "[t]he term 'in the surface region' means that the materials are formed, for example, on a sheet-like substrate with the dispensed material component not penetrating into the substrate...[t]his is the case, for example, in the case of smooth metal, ceramic, or plastic substrate, in which, for example the dispensed material components are accommodated in recesses...they can also be at least partially porous substrates

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into which the dispensed material components adsorb or penetrate at least partially. [I]n this case, the material is formed in accordance with the invention in the uppermost layer of the sheet-like substrate, i.e. in the surface region... [I]n this case, the penetration depth of the dispensed material components is preferably a maximum of 100 microns, in particular a maximum of 10 microns..." Schultz discloses that the substrate and its surface preferably form a rigid support on which to carry out the reactions (col. 11, lines 55-57). Schultz further discloses that the substrate may be any of a wide variety of materials including polymers, plastics, pyrex, quartz, resins, silicon, silica or silica-based materials, carbon, metals, inorganic glasses, inorganic crystals, membranes, etc. (col. 11, lines 57-61). Schultz subsequently discloses that the surfaces on the solid substrate can be composed of the same materials as the substrate or they can be different, i.e. the substrates can be coated with a different material (col. 11, lines 63-66). Schultz additionally discloses that the substrate surface can contain thereon an adsorbent (for example, cellulose) to which the components of interest are delivered (col. 11, line 66-col. 12, line 1). Schultz discloses that the most appropriate substrate and substrate-surface materials will depend on the class of materials to be synthesized and the selection in any given case will be readily apparent to those of skill in the art (col. 12, lines 1-5). Schultz discloses that the substrate may be divided into individually defined positions spatially delimited from one another by distance, dimples, wells, raised regions, etched trenches, etc. to prevent reactant components in the individual reaction regions from moving or diffusing into other reaction regions (COL. 5, lines 54-64; COL. 10, lines 7-23; COL. 11, lines 53-55; COL. 13, lines 24-42). Schultz et al. provide for both embodiments of where materials do not penetrate the substrate since the substrate and its surface may be made of the same material, such as metal, ceramic, or plastic; the reaction is

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disclosed as being conducted **on** not into the substrate; and the desire to prevent contamination among reaction regions and where materials partially penetrate the substrate since the substrate surface may contain an adsorbent, such as cellulose, to which the components of interest are delivered. Additionally, it is noted that the occurrence and depth of penetration into the substrate depends on the material and quantity of material dispensed. Regarding partial penetration into the substrate, the penetration depth depends on how much of the material is dispensed and the porosity of the substrate surface. Since nanoliter amounts of materials are being dispensed, one would expect that the penetration depth is no more than 100 microns. Furthermore, the dimples may be considered pores in the substrate since <http://m-w.com> defines a pore as **1**: a minute opening especially in an animal or plant; *especially* : one by which matter passes through a membrane **2**: a small interstice (as in soil) admitting absorption or passage of liquid. These dimples will preferably have a depth of less than 100 microns and more preferably less than 25 microns below the upper surface of the substrate, such that the dispensed material absorb or penetrate at a maximum of 100 microns (col. 13, lines 43-52). Nevertheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select either a penetrating or non-penetrating substrate as provided as options in Schultz to accommodate the materials used and formed in synthesis.

The instant specification discloses "...solvents of high surface tension which are virtually unable to form hydrogen bridges..." It has been interpreted that liquids with high surface tension would be unable to form hydrogen bridges. Schultz discloses various dispensed reactants including copper oxide, lead oxide, magnesium oxide, strontium carbonate, calcium nitrate, etc. It appears that each of these solutions would have high surface tensions and would not form

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hydrogen bridges. Schultz discloses that there are techniques to ensuring that solutions in the individual reaction regions do not wet the surrounding surface and contaminate other regions (col. 14, lines 22-31). Schultz also discusses that whether or not a liquid droplet will wet a solid surface is governed by the surface tension at the liquid-air interface, the solid-liquid interface, and solid-air interface (col. 14, lines 32-35). If the sum of the liquid-air and liquid-solid tensions is greater than the solid-air tension, the liquid will form a bead (col. 14, lines 35-38). If the sum of the liquid-air and liquid-solid tensions is less than the solid-air tension, the liquid will spread over the surface (col. 14, lines 38-41). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use liquids of high surface tension in Schultz to prevent spreading of liquid into adjacent regions and contamination.

15. Claims 12 and 13 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,985,356 to Schultz in view of U.S. Patent No. 6,541,271 to McFarland et al. or U.S. Patent No. 6,030,917 to Weinberg et al.

Schultz discloses that the most appropriate substrate and substrate-surface materials will depend on the class of materials to be synthesized and the selection in any given case will be readily apparent to those of skill in the art (col. 12, lines 1-5). Each of McFarland et al. and Weinberg et al. disclose that it is well known to use a non-porous substrate as required for particular synthesis and screening. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the substrate of Schultz to be non-porous as required for particular synthesis and screening as taught by McFarland et al. or Weinberg et al.

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16. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,985,356 to Schultz in view of U.S. Patent No. 5,925,732 to Ecker et al.

Regarding claim 15, Schultz discloses that the mask can be any of a wide variety of different materials, including polymers, plastics, resins, silicon, metals, inorganic glasses, etc. (col. 18, lines 25-29). Schultz does not explicitly disclose the mask made of fluorinated plastics of low wettability, such as polytetrafluoroethylene, polyvinylidene fluoride, or ECTFE. Ecker et al. disclose the mask is made of any solid inert material with respect to the chemical reactions to take place and capable of appropriate shaping, sterilizing, cleaning, and the like as may be desired (col. 14, lines 1-4). Ecker et al. disclose that polymer, such as nylon or PTFE (polytetrafluoroethylene), glass, ceramic, or metal are exemplary materials for making the mask (col. 14, lines 4-6; col. 6, line 55-col. 7, line 14). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the mask of Schultz to make it out of a fluorinated plastic, such as polytetrafluoroethylene, since it is a material inert to chemical reactions to take place and capable of appropriate shaping, sterilizing, cleaning, and the like as desired as taught by Ecker et al.

Regarding claim 16, in the event one would argue that the mask of Schultz does not have holes with inclines of at least 5 degrees, Ecker et al. shows the mask with holes having inclines of at least 5 degrees to funnel liquid at specific sites onto a collection receptacle (figs. 6-8; col. 6, lines 28-52; col. 13, line 49-col. 14, line 46). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the holes of the mask of Schultz to have an incline at least 5 degrees to funnel liquid at specific sites onto a collection receptacle as taught by Ecker et al.

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17. Claims 17, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,985,356 to Schultz in view of U.S. Patent No. 6,028,189 to Blanchard and/or U.S. Patent No. 5,731,264 to Narayanan et al. and/or U.S. Patent No. 5,122,301 to McCoy et al.

Schultz discloses methods and apparatus for parallel deposition, synthesis, and screening of an array of diverse materials at known locations on a single substrate surface (col. 1, lines 12-15). Schultz does not explicitly disclose propylene carbonate, ethylene carbonate, or gamma-butyrolacton as the liquids forming the suspensions. Blanchard discloses using a high surface tension solvent, such as propylene carbonate, since the solvent exhibits additional characteristics of having a high boiling point to prevent evaporation and clogging of the dispenser and high viscosity to prevent unstable drop formation (col. 2, lines 23-43; col. 4, lines 30-32). These characteristics make propylene carbonate suitable for use in a microfabricated ink-jet pump apparatus (col. 3, lines 60-62). Propylene carbonate also does not destroy or degrade a variety of synthetic polymers and can be used in procedures for automated synthesis employing plastic parts (col. 4, lines 30-67). Narayanan et al. disclose that propylene carbonate and gamma-butyrolactone are suitable solvents for dissolving active herbicides—sulfonyl or sulfamoylurea—and does not promote proton exchange between the herbicide and solvent (abstract). McCoy et al. disclose that propylene carbonate and ethylene carbonate are useful as effective carriers for antimicrobials, such as bromonitrostyrene (BNS) or bromonitroethenylfuran (BNEF) by combining features of minimized activity loss for the supported antimicrobials as well as the characteristics of the carriers being non-toxic, non-flammable, non-corrosive, odorless, and colorless (col. 3, lines 3-53). The compositions also have a high boiling point and flash point and low vapor pressure (col. 3, lines 53-55; col. 5, line 58-col. 6, line 9). The compositions

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provide good stability and solubility of antimicrobials (col. 3, lines 55-58). Propylene carbonate has low toxicity and is non-carcinogenic (col. 5, lines 29-57). Propylene carbonate is compatible³ with many types of materials, including stainless steel, carbon steel, TEFLON, EPR, neoprene, natural rubber, cork, and polyethylene (col. 6, lines 14-16). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Schultz to use propylene carbonate, ethylene carbonate, or gamma-butyrolactone as liquids to form the suspensions since they have characteristics preventing evaporation, clogging of the dispenser and high viscosity to prevent unstable drop formation, and encouraging automation using plastic parts as taught by Blanchard and/or since that stable compositions with active sulfonyl or sulfamoylurea herbicides as taught by Narayanan et al. and/or since they are non-toxic, non-flammable, non-corrosive, odorless, colorless, non-carcinogenic, and compatible with many materials as taught by McCoy et al.

18. Claims 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,985,356 to Schultz in view of (U.S. Patent No. 6,028,189 to Blanchard and/or U.S. Patent No. 5,731,264 to Narayanan et al. and/or U.S. Patent No. 5,122,301 to McCoy et al.) and (U.S. Patent No. 6,620,625 to Wolk et al. and/or U.S. Patent No. 4,092,116 to Giaever and/or U.S. Patent No. 6,475,809 to Wagner et al. and/or U.S. Patent No. 6,260,407 to Petro et al. and/or U.S. Patent No. 6,420,180 to Bass and/or U.S. Patent No. 6,024,925 to Little et al.)

Schultz discloses methods and apparatus for parallel deposition, synthesis, and screening of an array of diverse materials at known locations on a single substrate surface (col. 1, lines 12-15). Schultz does not explicitly disclose propylene carbonate, ethylene carbonate, or gamma-butyrolacton as the liquids forming the suspensions. Blanchard discloses using a high surface

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tension solvent, such as propylene carbonate, since the solvent exhibits additional characteristics of having a high boiling point to prevent evaporation and clogging of the dispenser and high viscosity to prevent unstable drop formation (col. 2, lines 23-43; col. 4, lines 30-32). These characteristics make propylene carbonate suitable for use in a microfabricated ink-jet pump apparatus (col. 3, lines 60-62). Propylene carbonate also does not destroy or degrade a variety of synthetic polymers and can be used in procedures for automated synthesis employing plastic parts (col. 4, lines 30-67). Narayanan et al. disclose that propylene carbonate and gamma-butyrolactone are suitable solvents for dissolving active herbicides—sulfonyl or sulfamoylurea—and does not promote proton exchange between the herbicide and solvent (abstract). McCoy et al. disclose that propylene carbonate and ethylene carbonate are useful as effective carriers for antimicrobials, such as bromonitrostyrene (BNS) or bromonitroethenylfuran (BNEF) by combining features of minimized activity loss for the supported antimicrobials as well as the characteristics of the carriers being non-toxic, non-flammable, non-corrosive, odorless, and colorless (col. 3, lines 3-53). The compositions also have a high boiling point and flash point and low vapor pressure (col. 3, lines 53-55; col. 5, line 58-col. 6, line 9). The compositions provide good stability and solubility of antimicrobials (col. 3, lines 55-58). Propylene carbonate has low toxicity and is non-carcinogenic (col. 5, lines 29-57). Propylene carbonate is compatible³ with many types of materials, including stainless steel, carbon steel, TEFLON, EPR, neoprene, natural rubber, cork, and polyethylene (col. 6, lines 14-16). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Schultz to use propylene carbonate, ethylene carbonate, or gamma-butyrolactone as liquids to form the suspensions since they have characteristics preventing

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evaporation, clogging of the dispenser and high viscosity to prevent unstable drop formation, and encouraging automation using plastic parts as taught by Blanchard and/or since that stable compositions with active sulfonyl or sulfamoylurea herbicides as taught by Narayanan et al. and/or since they are non-toxic, non-flammable, non-corrosive, odorless, colorless, non-carcinogenic, and compatible with many materials as taught by McCoy et al.

Schultz discloses: The substrate may be any of a wide variety of materials including polymers, plastics, pyrex, quartz, resins, silicon, silica or silica-based materials, carbon, metals, inorganic glasses, inorganic crystals, membranes, etc. (col. 11, lines 57-61). Surfaces on the solid substrate can be composed of the same materials as the substrate or they can be different, i.e. the substrates can be coated with a different material (col. 11, lines 63-66). The substrate surface can contain thereon an adsorbent (for example, cellulose) to which the components of interest are delivered (col. 11, line 66-col. 12, line 1). Schultz et al. disclose that the most appropriate substrate and substrate-surface materials will depend on the class of materials to be synthesized and the selection in any given case will be readily apparent to those of skill in the art (col. 12, lines 1-5). Schultz does not explicitly disclose that the substrates may be made of silicon carbide, titanium nitride, or gold. However, these materials are well known, widely used, and commercially available as disclosed in subsequent prior art. Wolk et al. disclose that gold, platinum, and titanium substrates do not easily corrode under potentially high salt conditions and applied electric fields (col. 12, lines 8-16). Giaever discloses that gold substrates economically and successfully achieve optical examination by reflected light (col. 8, line 44-col. 9, line 26). Wagner et al. disclose that the portion of the surface of the substrate on which patches reside is preferably flat and firm or semi-firm, and suitable materials include gold (col. 7, line 57-col. 8,

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line 16). Petro et al. disclose the substrate can be a structure with rigid or semi-rigid surface on which or into which sample can be formed and deposited (col. 19, lines 5-7). The substrate material should be inert to the reaction and can withstand certain process conditions (col. 19, lines 5-14). A suitable material includes silicon carbide (col. 19, line 18). Bass et al. disclose that rigid materials, including gold, may be of interest (col. 13, line 34). Little et al. disclose that gold is an insoluble support onto which sample may be deposited (col. 13, lines 51-63).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method to use substrates of silicon carbide, titanium nitride, and gold in Schultz to use a material that does not corrode easily under potentially high salt conditions and applied electric fields as taught by Wolk et al. and/or to economically and successfully achieve optical examination by reflected light as taught by Giaver and/or to use a flat and firm or semi-firm material as taught by Wagner et al. and/or to use materials inert to the reaction and can withstand certain process conditions as taught by Petro et al. to use a rigid substrate as taught by Bass and/or to use an insoluble support onto which sample may be deposited.

Response to Arguments

19. Applicant's arguments filed 4/9/2004 have been fully considered but they are not persuasive.

20. The 35 USC 112 rejection of claim 8 has been maintained since the recitation of "sheet-like substrate being laid onto a matrix plate" does not describe a matrix plate laid on the sheet-like substrate as indicated on page 4 of the response. The recitation means that the sheet-like substrate is placed on top of the matrix plate, and the response describes the matrix plate as being

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placed on top of the sheet-like substrate. There is a distinct difference between the two. While the response's clarification of the matrix plate with holes is laid onto the sheet-like substrate makes more sense, the claim is clearly reciting the opposite—the sheet-like substrate is laid onto the matrix plate.

21. Applicants argue that Schultz differs from the instant invention that it does not require the material samples to be produced in the surface regions of the substrate. Applicant explains that the instant specification describes this limitation as meaning the materials are formed on a sheet-like substrate with the material component not penetrating into the substrate or at a maximum penetration of 100 microns (spec, page 3, lines 29-35). Applicant argues that in contrast Schultz describes the substrate as “any conceivable substrate” (col. 11, lines 45-50). Applicant further argues that the substrate surface can contain an adsorbent to which components of the test materials are to be delivered (col. 11, lines 66-col. 12, line 1). Applicant concludes that Schultz does not describe material samples in the surface regions of the substrate to anticipate claim 1 of the instant invention. Examiner points out that the instant specification on page 3, lines 25-35 disclose that: The term “in the surface region” means that the materials are formed, for example on a sheet-like substrate with the dispensed material component not penetrating into the substrate. This is the case, for example, in the case of smooth metal, ceramic or plastic substrates, in which, for example, the dispensed material components are accommodated in recesses. However, they can also be at least partially porous substrates into which the dispensed material components adsorb or penetrate at least partially. In this case, the material is formed in accordance with the invention in the uppermost layer of the sheet-like substrate, i.e. in the surface region. In this case, the penetration depth of the dispensed material components is

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preferably a maximum of 100 microns, in particular a maximum of 10 microns. Therefore, the limitation “in the surface region” encompasses both non-penetration and at least partial penetration. Schultz meets the limitation by disclosing that: (1) the substrate can be made of the same materials as disclosed in the instant specification (i.e. metal or plastic), may contain raised or depressed regions on which synthesis takes place, the substrate and its surface may be made of the same materials, the reaction is disclosed as being conducted ~~on~~ not into the substrate, and the desire to prevent contamination among reaction regions in which these characteristics imply a non-penetrating substrate, and (2) the substrate surface can contain thereon an adsorbent (for example, cellulose) to which the components of interest are delivered for partial penetration. The limitation of “maximum penetration depth of 100 microns” is not recited in claim 1. The limitation of “in the surface regions” is not limited to or narrowed to “maximum penetration depth of 100 microns” by virtue of mentioning it in the specification. The maximum penetration depth is an example of how much a liquid may penetrate an at least partially porous substrate. It is not a definition but an example of how the at least partially porous substrates are penetrated by liquid. The occurrence and amount of penetration of the dispensed material depends on what is being dispensed, how much is being dispensed, and the porosity of the substrate. Additionally, the dimples may be considered pores, and Schultz discloses them having a depth of preferably less than 100 microns and more preferably less than 25 microns, such that the pores penetrate the substrate at a max of 100 microns. Furthermore, the presence of claims 12-14 (in which claim 12 recites dispensed material does not penetrate into the substrate; and claim 13 recites the material are accommodated in recesses and the substrate is made of metal, ceramic, or plastic; and claim 14 recites the maximum penetration depth of 100 microns) further limiting the term

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“in the surface regions” is a demonstration that the limitations in claims 12-14 are possible embodiments meeting the term but not an actual definition.

22. Applicant argues that with respect to claim 3 in which it was rejected in view of Schultz in view of Stylli or Carl the Examiner has failed to meet the burden of establishing prima facie obvious. Applicant argues that Schultz does not describe the limitations of claim 1, such as producing samples in the surface regions of the substrate, and neither Stylli nor Carl render this limitation obvious. Applicant argues that Examiner has not indicated how the description of Stylli in combination with Schultz renders the instant invention obvious. Applicant argues that the Examiner cites Carl to disclose the same element for which the Examiner has cited Stylli. Applicant concludes that the combination of Schultz, Stylli, and Carl do not render the instant invention obvious. Examiner notes that the response has not indicated how the Examiner has not met the burden of prima facie obvious. Examiner has met the burden of establishing prima facie obvious by showing that it is well known and widely used to carry out dispensing by displacing movable plungers in the dispensing device. Schultz discloses various means of dispensing. Stylli and Carl both teach that carrying out dispensing by displacing movable plungers produces accurate, precise, and adjustable amounts of liquid. There is a reasonable expectation of success by a different dispenser in Schultz to have better control in liquid dispensing. As described above Schultz meets the limitation of claim 1, and Schultz in view of Stylli or Carl render obvious claim 3 obvious.

23. Applicant argues that claim 4 is not rendered obvious by the addition of Turner.

Applicant argues that the description in Turner does not describe the instant invention.

Applicant argues that Turner describes the preparation of the metal precursor in a reaction vessel

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with “the ligand member may be added to a reaction vessel at the same time as the metal or metal precursory compound along with additional reactants in the reaction of interest”.

Applicant argues that the library of Turner is not produced on a substrate as claimed in claim 4.

Applicant concludes that one of ordinary skill in the art would not think it obvious to use the sheet-like substrate of the instant invention in view of Turner that uses reaction vessels.

Examiner notes that claim 4 was rendered obvious over Schultz in view of Stylli or Turner, in which the response has not addressed Stylli. Additionally, Turner teaches generating libraries from parent libraries by sheet-like substrates (see fig. 2, which is associated with col. 14, line 31-col. 16, line 38 as cited in the previous Office Action). Examiner was pointing to a specific portion of Turner—col. 14, line 31-col. 16, line 38. Turner may disclose reaction vessels, but Examiner was pointing to the portion where sheet-like substrate is used. Each of Stylli and Turner show how mixing on an auxiliary substrate and dispensing onto the sheet-like substrate is beneficial in high-throughput processing and screening of chemical libraries. Therefore, claim 4 is rendered obvious by Schultz in view of Turner or Stylli.

Conclusion

24. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Quan whose telephone number is (571) 272-1261. The examiner can normally be reached on M-F (8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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